The Effects of Respondent Rules on Health Survey Reports

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Abstract: Survey researchers believe that self reports, in general, are more accurate than reports obtained by proxy. This paper focuses on the reassessment of previous self/proxy comparisons and presents findings from a telephone adaptation of the National Health Interview Survey (NHIS) designed to investigate response error associated with self and proxy reports. Unlike previous studies in which the type of report is confounded with characteristics of the population home at the time of the interview, the design of this study (random allocation to self or proxy report) allows comparison of reports from similar populations. The results show that when self response is limited to a randomly selected respondent, the self respondents report fewer health events for themselves versus for others in their household. (*Am J Public Health* 1985; 75:639–644.)

Introduction

Researchers designing health surveys often face tradeoffs among costs, sampling errors, and nonsampling errors. No better example of this problem exists than the decision to use individuals in a sample household to report survey data both for themselves and for others in the households. As the number of people reported for by a single respondent increases, the survey costs per person in the sample decreases, and lower sampling error for the survey statistics can be obtained for a given total cost of the survey. This decrease in sampling error, however, may be obtained at the cost of higher response error due to the informant's inability or lack of motivation to recall health events concerning other household members.

This is not a new issue to health surveys, but one that has a curious history of methodological investigations. The general belief among survey designers of health surveys is that self-response is preferred if costs can be tolerated.

Previous studies which address the relation between respondent rules and response error suffer major design flaws, the most notable of which is the exclusive use of persons at home when the interviewer visits as both self respondents and as informants about others who are then absent from the household. We note that those persons who tend to be at home are distinctive in their health characteristics from others in the household. For this reason, comparisons of health reports for those with self and proxy reported data confound true differences between groups with different response error characteristics of the reports.

This paper presents the findings of a methodological study that randomly assigned to persons in sample households the respondent rule to be used for reports on their health. These data are contrasted with those of prior studies, and a variety of alternative response error models are examined.

Response Error Differences in Self and Proxy Reporting

There are several reasons which explain why self reporters might be more accurate than reporters for others. First, the respondent who reports for someone else may lack knowledge about the event or characteristic in question. Second, since events occurring to others are usually not as salient as events which occur to oneself, the proxy reporter may tend not to recall health events or recall only the most serious. Saliency may also affect a respondent's ability to date events accurately when reporting for others.

Conversely, there appear to be two reasons why proxy reports may be more accurate than self reports. First, knowledge about health status and events may be seen as a function of a role within the family, the "health monitor" who nurses family members, arranges for medical care for preventive and curative purposes, or who pays the medical bills. The responsibility of this role may heighten the salience of events occurring to others in the family and lead the health monitor to provide more accurate reports. Another reason supporting the hypothesis of better reporting for others than for oneself involves social desirability effects. It may be perceived to be more acceptable to report embarrassing health information about someone else than about oneself.

Early Respondent Rule Studies

The Appendix presents a selected summary of a number of respondent rule studies.[1–11] Although early studies indicate less agreement between interview report and medical record for proxy reports than for self reports, more recent studies indicate no difference in response error by type of respondent,[10] or suggest that in some cases proxy reports may be more accurate.[11]

There are inferential problems with both validated and clinical examination studies. For both types of studies, the selection of the self respondent was not random. Self respondents were defined as those adults who were home at the time of the interview. Conclusions concerning quality of reports (for self or proxy reports) are thus confounded by characteristics of the population home at the time of contact. The studies comparing clinical examinations with survey reports are also plagued by a second problem. Given that the clinical examination followed the interview, the respondent may not have had knowledge of a condition. If the finding of previously unknown conditions differs for self and proxy reports, this potentially confounds the comparison.

The majority of studies comparing self and proxy reports without validation data assume that reports of *more* health events indicate more accurate reporting. Although the underreporting of health events is well documented,[12] overreporting has also been documented.[11] The appropriate conclusion from these studies is not that self reporting is necessarily better, but that estimates based on different respondent rules may differ.

Research Design

A telephone survey adaptation of major portions of the National Health Interview Survey was conducted by The

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University of Michigan Survey Research Center in the Fall of 1979. The focus of the study was: 1) to provide data for comparison with the National Health Interview Survey (NHIS) face-to-face interview; and 2) to explore several models of telephone interviewing. The sample was divided into three replicates, introduced at the beginning of October, November, and December. Each was a two-stage stratified sample of randomly generated telephone numbers, following the design of Waksberg.[13] Data on 8,210 persons (4,400 cooperating families) were obtained, for a response rate of 80 per cent.*

In all households, one person from each family acted as a reporter on the health status of all adult family members. As part of a study of relative response errors associated with different respondent rules, two alternative procedures were randomly assigned to half samples. In the *random respondent* half-sample, a household listing was taken from the person who answered the telephone. One respondent from among those age 17 years or older was then selected using procedures similar to those of Kish.[14] In the *knowledgeable adult* half-sample, any adult answering the telephone who judged themselves capable of answering the health questions did so for all adult members of their own family.

Self-Proxy Differences under the Knowledgeable Phone Answerer Respondent Rule

The knowledgeable phone answerer resembles the reporting rule most often used in past self-proxy comparisons in which only those adults who are at home at the time of the interviewer's call can be family informants. The rule as implemented in the telephone survey differs, however, from that implemented in other NHIS studies since only one person among those present provided self reports (even though other adults might be present, they did not respond for themselves). The family informant was not designated randomly from among those present, but rather was usually the one who answered the telephone.

Table 1 shows the difference between self reports and proxy reports in the knowledgeable phone answerer respondent rule. Three columns in the Table present results for different groups of self reporters: those in single person families (who must be self reporters), those in families of two or more persons, and the total self respondent group. A fourth column contains results for proxy reporting. Similar to the past studies, these self-proxy comparisons are affected by a confounding of response error associated with reporter and true differences in characteristics of the two groups.

Most past analyses examined differences between all self reports and all proxy reports. If we perform a similar analysis on the telephone survey data (column 5) it can be seen that for some measures self respondents report more health events for themselves, while for other measures they report fewer events for themselves than for proxies. The trend in the results to some extent supports the generally accepted belief that self respondents report more health events for themselves than for others.

Table 1 provides another comparison of self and proxy reporting, one that recognizes the fact that one person families are, by definition, all self reporters. Thus, removing the one person families from the self reporter group can purify the comparison of self and proxy reporting (column 6). Self reports of health events among people in families of two or more persons are generally lower than those for proxy reports. For example, there were about 83 fewer bed days reported per quarter per 100 self reporters than per 100 proxied persons. There is also some indication of higher reporting for *self* respondents on measures involving a 12-month recall. The overall finding that most of the differences are not large is substantively important to designers of health surveys because it implies the possibility of lower per interview costs without any difference in data quality.

Self-Proxy Differences under the Random Respondent Rule

Although the removal of reports for one person families purified the self-proxy comparison, the differences observed are still confounded with true health differences between the phone answerers and others in their families. The random respondent rule removes this confounding. Since the self respondent is a random selection from among all adults in the household, the proxied persons are a complementary random sample. The expected values of these two groups should be identical, using properly weighted estimates.

Table 2 presents the self-proxy comparison for the random respondent rule. As in Table 1, we have separated the self reporters in single person families from those in multiple person families. Thus, assuming no response or nonresponse error differences, the self reports from those in multiple person families should have the same expected value as those for proxied persons in multiple persons families.

The trend in Table 2 is clearly one of more health events for proxied persons than for self reporters. For example, self reporters (in 2+ person families) have 125 fewer bed days per 100 people per quarter than proxied persons. The only variable for which self responses resulted in more reports than proxy responses is chronic conditions.

Multivariate Models for Examining Self/Proxy Differences

In light of beliefs held by survey researchers that self reports result in more reporting of health events and are generally more accurate, the above findings are surprising. This section focuses on several alternative hypotheses for response differences.

There are two possible sources of error which may explain the findings in Table 2. As noted earlier, the values for self reports and proxied respondents assigned to the random respondent rule (with at least two adults) should be identical. Deviations from equal estimates may be due to differential nonresponse or response error. Table 3 presents the age, sex, and race characteristics of self and proxy reports for families with at least two adult members. The proportions suggest that the differences between self and proxy reports discussed in Table 2 may be the result of lower response rates for males and individuals at both ends of the age distribution (17–24 years old and 75+).

One way to make a simple adjustment for differential nonresponse is to include those demographic characteristics of the sample person in a model predicting the frequency of reporting health events. To the extent that gender and age groups are homogeneous on the health variables, this modeling will remove effects of differential nonresponse across the groups. Due to the skewness of the health event variables (with the vast majority reporting no event) logistic response models were fitted for seven of the health events presented

*Response rate was defined as the ratio of all complete and partial family interviews divided by the estimated total number of families sampled (total number of families interviewed + total number of families refused or not interviewed after first contact + total number of other working household numbers where number of families is unknown). Those numbers that rang without answer but whose household status was unconfirmed are included in the base.

TABLE 1—Self-Proxy Differences for the Knowledgeable Adult Respondent Rule*

Variable	Self Respondents			Persons with Proxy Reporting	Differences[1]	Differences[2]
	1 Person Families	2+ Person Families	Total			
1. Two-Week Recall (Rates per 100 people per quarter)						
Bed Days	215.8	143.0	165.1	225.6	−60.5 (−113.7, −7.4)	−82.6 (−141.0, −24.2)
Work Loss Days	199.6	161.9	172.9	228.2	−55.3 (−118.5, 7.9)	−66.3 (−135.7, 3.1)
Cut Down Days	357.5	263.9	292.5	241.2	+51.3 (−17.1, 119.7)	+22.7 (−52.5, 97.9)
Doctor Visits	217.1	158.0	176.2	161.9	+14.3 (−14.2, 42.8)	−3.9 (−35.3, 27.3)
Dental Visits	68.3	41.0	58.5	55.9	+2.6 (−11.6, 16.8)	−14.9 (−30.5, 0.7)
Acute Conditions	137.2	129.4	132.0	111.2	+20.8 (−0.2, 41.8)	+18.2 (−1.4, 37.8)
2. One-Year Recall (Rates per 100 people per Year)						
Hospitalizations	18.2	17.2	17.5	14.4	+3.1 (0.9, 5.4)	+2.8 (0.3, 5.3)
3. Two-Week Recall (Percentages with at least one)						
Bed Days	10.4	8.2	8.9	9.9	−1.0 (−2.8, 0.8)	−1.7 (−3.6, 0.2)
Work Loss Days	7.8	6.5	6.9	9.5	−2.6 (−3.6, −1.6)	−3.0 (−4.8, −1.2)
Cut Down Days	11.3	10.5	10.7	9.9	+0.8 (−1.0, 2.6)	+0.6 (−1.4, 2.7)
Doctor Visits	21.5	17.6	18.8	16.5	+2.3 (0.1, 4.5)	+1.1 (−1.3, 3.5)
Dental Visits	7.4	6.8	7.0	7.2	−0.2 (−1.8, 1.4)	−0.4 (−2.1, 1.3)
Acute Conditions	17.3	17.3	17.3	15.5	+1.8 (−0.5, 4.1)	+1.8 (−0.7, 4.3)
4. 12-Month Recall (Percentages with at least one)						
Chronic Conditions	36.3	31.9	33.2	30.0	+3.2 (0.4, 6.0)	+1.9 (−1.2, 5.0)
Hospitalizations	14.5	14.5	14.5	11.8	+2.7 (0.7, 4.7)	+2.7 (0.4, 5.0)
Doctor Visits	75.1	77.6	76.8	67.8	+9.0 (6.2, 11.8)	+9.8 (6.8, 12.0)
Approximate N	704	1591	2295	1832		

*Estimates adjusted for the existence of multiple telephone numbers in a household. 95% confidence intervals are given in parentheses.
1) Difference = (Total Self Respondents) − (Persons with Proxy) Reports
2) Difference = (Self Respondents in 2+ families) − (Persons with Proxy) Reports

in Table 2. (The substantive conclusions would be the same if binary variable OLS procedures were used.)

The estimated coefficients and standard errors are presented in Table 4. The simple adjustment for nonresponse affects the interpretation of the findings from Table 2. Proxy effects still remain for bed days and dental visits, and a proxy effect is also evident for number of work loss days. In each case, use of a proxy resulted in more reports of health events.

A second factor which may affect the quality of the response is the number of adults about whom the respondent must report. As noted above, one adult was required to report for all adults in the family. For large families, the burden on the respondent could result in "poorer" reporting. However, in logistic models (and OLS binary regression) which included the sample person's age and sex, there was no evidence of an interaction between the effect of response rule and the number of adults in the family.

Another strategy for evaluating self and proxy reports examines characteristics of health reports that relate to different hypotheses about response errors. It has been hypothesized that one potential cause of higher proxy reporting might be the reluctance of persons to report embarrassing health conditions about themselves. If it were found that there were relatively greater numbers of embarrassing conditions in proxy reports than in self reports, the finding would be consistent with this hypothesis.

To investigate this, both chronic and acute conditions reported in the telephone interviews were classified by their level of potential embarrassment (or threat). Conditions that were labeled as "threatening" to the respondent included malignant neoplasms, psychoses, and diseases of the genitourinary system. In contrast, non-threatening conditions included viruses, allergies, diabetes, heart disease, and hypertension. The finding of no difference in the percentage of threatening acute or chronic conditions between self and

TABLE 2—Self-Proxy Differences for the Random Respondent Rule*

Variable	Self Respondents: 1 Person Families	Self Respondents: 2+ Person Families	Persons With Proxy Reports	Difference[2]
1. Two-Week Recall (Rates per 100 people per quarter)				
Bed Days	182.7	102.1	226.9	−124.8 (−185.1, −64.5)
Work Loss Days	162.5	137.8	199.6	−61.8 (−130.0, 6.4)
Cut Down Days	256.1	219.7	289.3	−69.6 (−152.7, 13.4)
Doctor Visits	175.5	143.7	168.4	−24.7 (−58.0, 8.6)
Dental Visits	64.4	50.1	67.6	−17.5 (−34.7, −0.3)
Acute Conditions	137.8	98.2	119.0	−20.8 (−39.9, −1.7)
2. 12-Month Recall (Rates per 100 people per year)				
Hospitalizations	16.4	15.6	15.2	+0.4 (−1.9, 2.7)
3. Two-Week Recall (Percentages with at least one)				
Bed Days	8.0	5.3	9.9	−4.6 (−6.4, −2.8)
Work Loss Days	7.8	5.7	7.5	−1.8 (−3.5, −0.1)
Cut Down Days	9.3	8.5	9.5	−1.0 (−3.0, 1.0)
Doctor Visits	19.8	15.2	17.2	−2.0 (−4.5, 0.5)
Dental Visits	6.9	6.2	8.1	−1.9 (−3.7, −0.1)
Acute Conditions	17.8	13.3	17.0	−3.7 (−6.2, −1.2)
4. 12-Month Recall (Percentages with at least one)				
Chronic Conditions	37.4	33.7	29.6	+4.1 (0.8, 7.4)
Hospitalizations	11.5	13.0	11.8	+1.2 (−1.4, 3.8)
Doctor Visits	76.9	75.7	73.2	+2.5 (−0.6, 5.6)
Approximate N	734	1345	1795	3140

*Estimates adjusted for the existence of multiple telephone numbers in a household and the unequal chance of selection as the "random respondent."
95% confidence intervals are given in parentheses.
1) Difference = (Self respondents in 2+ families) − (Persons with proxy) reports.

proxy reports does not support the hypothesis of bias due to social desirability.

Another response error hypothesis concerns the seriousness of a reported condition. Minor conditions should be more salient to the person suffering the condition and thus disproportionately reported by self reporters. This hypothesis predicts a finding of greater numbers of reports for self respondents. Both chronic and acute conditions were classified as serious or not serious. Almost all acute conditions are classified as non-serious, and there are no differences between self and proxy reports in the proportion classified serious. For chronic conditions, however, it was found that more self reports were judged "not serious" (40 per cent) than were proxy reports (30 per cent). The support of the hypothesis that self reporters mention a larger relative number of nonserious conditions is compatible with the finding of greater self reporting of health events. We remind the reader that chronic conditions was one of the few variables that exhibited higher levels of self reports.

TABLE 3—Demographic Characteristics for Random Respondent Families

Characteristics	Self Reports*	Proxy Reports*
Sex		
Male	43.5%	53.6%
Female	56.1	46.2
Age		
17–24	13.3	20.4
25–34	23.2	21.3
35–44	20.2	17.2
45–54	18.6	15.9
55–64	14.4	13.1
65–74	7.9	7.9
75+	1.8	3.0
Race		
White	89.1	89.8
Nonwhite	10.9	10.2
N	1345	1635

*Estimates weighted by reciprocals of selection probabilities.

TABLE 4—Results from Logit Models Adjusting for Nonresponse*

Coefficient (SE)	Health Variables						
	Bed Days	Work Loss Days	Dental Visits	Doctor Visits	Hospital Visits	Acute Conditions	Chronic Conditions
Age	−.004	−.012‡	.000	.009‡	.011‡	−0.16‡	.035‡
SE	(.004)	(.005)	(.005)	(.003)	(.004)	(.004)	(.003)
Sex	.047	−.139	.290	.343‡	.478‡	.188	−.063
SE	(.143)	(.154)	(.151)	(.106)	(.121)	(.109)	(.087)
Self/Proxy†	.736‡	.337‡	.422‡	.207	−.204	.202	−.141
SE	(1.58)	(.161)	(.156)	(.107)	(.118)	(.111)	(.087)
GOF	322.97	275.37	400.22	283.06	365.97	372.70	460.86
DF	367	367	367	367	367	367	367
p-value	.953	1.0	.112	.950	.505	.408	.001

*Table based on self and proxy reports from 2+ adult families in household assigned to random respondent rule, N = 2711. The model used for each variable was: $\ln(p/1-p) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$. p is the proportion with at least one episode of the specific health event; is the constant; X_1 is the age of the person being reported for in single years; X_2 is an indicator variable for the sex of the person being reported for, where $X_2 = 1$ indicates female; X_3 is an indicator variable for self/proxy report where $X_3 = 1$ indicates a proxy report. Standard errors estimated under simple random sample assumptions.

†Ratio of coefficient to its standard error greater than 2.0.

The accuracy of dating health events may also be affected by the type of report. Here it was expected that the less accurate reporters would tend to place the event in time closer to the date of the interview, all things being equal. This error of forward telescoping of events has been repeatedly found as a problem in recall data.[15] When the dates of hospitalizations are examined for both groups, it is found that self reports are placed in time earlier than proxy reports (6.38 versus 5.47 months before the interview). This result is compatible with greater forward telescoping in proxy reports. There are no differences, however, between the two types of reports for two-week doctor visit reports.

Summary

The findings from this study present a mixed picture. Even after adjusting for differential nonresponse (although only a simple adjustment), the greater reporting of health events for proxy respondents remained. However, the hypothesis that supported more accurate reporting in proxy responses (the social desirability hypothesis) did not find support. The hypotheses that supported better self reporting received mixed support—i.e., evidence of more minor conditions reported by self respondents and of less forward telescoping in dating for hospitalizations. However, the overall finding is that, despite investigating several factors which may explain the increase in proxy reports for several health events, the effect remains.

The results of this study can be stated quite succinctly:

- As in past studies when self response is used for those who answer the telephone call and proxy report for others, self reporters appear to report more or about the same number of health events for themselves as for others;
- When self response is limited to a randomly selected respondent, they are found to report fewer health events for themselves versus others.

Thus, a well accepted finding that self response yields higher reports of health events appears to ignore the fact that the studies yielding this result have heavily restricted the type of person eligible for the self respondent rule. The proper inference from this literature appears to be that when persons who tend to be at home are used as family informants, it is to be expected that more health events will be reported for themselves versus others in the family. Part of these differences are no doubt the effect of true differences in health experiences and by themselves should not be used to indicate better reporting of one's own health versus others.

This study gives stimulus to further work on the dynamics of respondent motivation and ability to recall health events for other household members. The response differences observed might be taken by some to argue for better reporting when reporting for other family members. We have noted the difficulty of such interpretation, and instead react to the rather large differences (which appear to be robust to a large number of analytic adjustments) by noting that the respondent rule chosen for a study can have important impacts on the data obtained, and that separate investigations of their impacts on particular topics should be undertaken. Since different respondent rules can have large impacts on costs of the survey, these differential response errors deserve their own attention.

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APPENDIX

Summary of Respondent Rule Studies from Health Surveys

Study Name, Investigator, and Year	Nature of Proxy	Validation Data	Findings	Problems
California Health Survey, Mooney, 1952[1]	Not-at-Homes[a]	Yes	Less agreement between medical and survey records for proxy reports than for self reports. Improved reporting when original proxy was interviewed two weeks later.	Contamination in second interview due to effect of original interview.
National Health Interview Survey, Nisselson and Woolsey, 1957[2]	Split Sample[b]	No	Comparison of the two samples: significantly more reports of health conditions in "no-proxy" sample. Non-significant differences for number of bed or disability days.	Sample limited to Charlotte, North Carolina.
Hunterdon County Health Study, Elinson and Trussell, 1957[3]	Not-at-Homes[a]	Yes[c]	Self reports: 30% of conditions found in examination reported in interview, Proxy reports: 20%.	Low agreement rate possibly due to lack of knowledge of existence of conditions.
Chronic Disease in Household Interviews, Krueger, 1957[4]	Not-at-Homes[a]	Yes[c]	Proportion of matched conditions higher for respondents than for proxy reports (no discussion of significance).	Low agreement rate possibly due to lack of knowledge of existence of conditions.
National Health Interview Survey, Cannell, *et al*, 1965[5]	Not-at-Homes[a]	Yes[d]	7% underreporting rate of hospitalizations for self reports and 14% underreporting rate for proxy reports.	-----
Experimental Hospital Study, Cannell and Fowler, 1965[6]	Not-at-Homes[a]	Yes[d]	Three forms of questionnaire—1) control interview, 2) interview and self-administered follow-up, and 3) self-administered form. Underreporting rates range from 6%–10% for self reports and 6%–21% for proxy reports.	Sample limited to Detroit, Michigan and purity of self/proxy reports possibly contaminated by self-administered follow-up.
Physician Visits, Cannell and Fowler, 1963[7]	Not-at-Homes[a]	Yes[d]	No difference in proportion underreported by self and proxy reports.	Sample limited to members of community health clinic.
National Health Interview Survey, Kovar and Wright, 1972[8]	Split sample[b]	No	Significantly more reports for six of ten health measures using "all-self" reporting rule.	-----
National Health Interview-Reinterview Survey, Koons, 1973[9]	Not-at-Homes[e]	No	16% of relative net difference of persons reported for by others can be attributed to use of a proxy.	Contamination due to first interview, change in length of recall period, and assumption that self-report in reinterview is more accurate.
CHAS-NORC Health Survey, Andersen, *et al*, 1979[10]	Not-at-Homes[a]	Yes	No significant difference in proportion of underreports by self and proxy.	Possible bias due to 10% of respondents who did not give permission to obtain validation data.
National Medical Care Expenditure Survey, Berk, *et al*, 1982[11]	Not-at-Homes[a]	Yes[f]	Proxy reports more accurate for certain physical and mental health conditions.	-----

[a] **Not-at-homes:** Respondent rule where all adults home at time of interview were requested to take part in interview. Proxy responses accepted for all those not at home at time of interview and all children.
[b] **Split Sample:** 50% of sample allocated to an "all-self" respondent rule where all adults reported for themselves; 50% of sample allocated to a respondent rule where proxy reports accepted for adults not at home. Proxy reports for children used in both half-samples.
[c] **Validation** based on post-survey clinical examination.
[d] **Validation** based on forward-record check, where population of interested consisted of individuals with known hospitalizations or physician visits.
[e] **Proxy reports** accepted for not-at-homes in original interview. Only self-reports used in reinterview.
[f] **Validation data** obtained for a 32% sample of respondents.